methods adopted were extremely simple. The tips of growing roots, chiefly of seedlings, were injured in various ways by making incisions into the region about the apex, and the reactions that ensued were carefully followed and compared.

It was found, in confirmation and extension of the less complete observations of Prantl and of Simon, that the roots of ferns never truly regenerate themselves as do those of flowering plants. Possibly the difference is to be attributed to the more definite concentration of formative protoplasm in the apical cell of the former, as contrasted with its greater extension as layers in the roots of the latter. At any rate, no regeneration occurs in the roots of ferns, although some attempts at healing the actual wound may be made.

The case is different with the roots of phanerogams, although in them also the conditions of regeneration are more limited than might have been anticipated. In the first place, no union of the halves of longitudinally cut roots took place; the damaged apex was either replaced by a new one on either side of the slit or else the regeneration was confined to one half.

An annular incision made just behind the tip of the root into the cortex and extending as the endodermis fails to give the stimulus requisite to produce a fresh apex. Healing of the wound is more or less in evidence, but the original apex continues to function, and to supply cells for the further growth and elongation of the root. But if the knife has passed through the next layer, the pericycle, regenerative phenomena at once set in. A new apex, with all the complicated layers, is formed just behind (*i.e.* proximally to) the wound, and it is especially interesting to discover that the statolith starch now disappears from the original tip, to be transferred to, or at any rate to reappear in, the new one.

Lateral incisions are ineffective to bring about the differentiation of a new apex unless the slit has severed at least half the circumference of the pericycle. If this be done regeneration takes place, with the concomitant appearance of statolith starch in the new organ. All the experiments made on the roots go to emphasise the great importance of the pericycle in connection with regenerative processes, although it is not from this layer itself that the new tip is differentiated, but from the indifferent plerome cells within it. The damage done to the pericycle appears to act as an interruption of the coordinative relations between the various parts of the embryonic region as a whole. When this coordination is thus interrupted the capacity of giving rise to entire organs that is resident in the embryonic protoplasm asserts itself, and the new formation thus appears. We know as a matter of fact that the pericycle retains the embryonic condition until relatively late, since from it arise the normally produced lateral roots. Of course, the processes underlying the regenerative processes are by no means cleared up by the experiments indicated above, but at any rate certain definite facts have been ascertained, and further lines of profitable investigation readily suggest themselves.

Comparatively few anomalous cellular effects were observed. In the exceptional case of one fern root, however, the nuclei of the healing (not regenerative) cells exhibited irregularities both in their modes of division and in the number of their chromosomes which were commonly excessive. Multinucleate cells were also observed in the plerome of a wounded root of Ricinus, but they apparently took no part in the actual regenerative processes.

The book as a whole forms an important contribution to the literature of regeneration, its chief merit perhaps lying in the numerous problems it suggests for future investigation. It contains a bibliography that should be useful, but it would have been materially improved by the addition of a good index.

OUR BOOK SHELF.

Heredity. By C. W. Saleeby, M.D. Pp. 118. (London and Edinburgh: T. C. and E. C. Jack, n.d.) Price 1*s*. net.

THE appearance of a little shilling book on heredity is almost startling, when we consider the difficulty of the subject and the relative youth of its exact study. That a book like this should be possible indicates that considerable progress has been made in recent years. Was it not Leibnitz who said, "The more a science advances, the more it becomes concentrated in little books"? But it indicates also a noteworthy skill on the author's part. Without attempting to slur over difficult themes, *e.g.* Mendelism, as if they were easy, he has given us a clear and interesting exposition, which will be widely appreciated. It is a wonderful *multum in parvo*, dealing lucidly, for instance, with the contrast between hereditary resemblance and variation, between the germ-plasm and the body, between germinal variations and somatic modifications, between inherited nature and the results of nurture, between inborn and congenital characters, and so on. Even to have made these distinctions clear, so that they may be understanded of the people, is an achievement. As was natural in a book of this kind, the author takes up an eclectic position, and quotes freely from various writers—from one about ten times. He is inclined to allow that there is a limited transmission of "acquirements" or modifications, but the only instance we have found is an inept one—that bacteria may transmit an exaltation of their virulence. He agrees with Dr. Archdall Reid on many points, *e.g.* that amphimixis never produces more than regressive variations, but does not think that this author satisfactorily accounts for the origin of spontaneous variations. He has the same complaint to make of Weismann, but in regard to a view which that progressive biologist no longer holds, as, indeed, the author seems to know (p. 54). We may also note that even in "The Germ-Plasm" Weismann did not teach that "parthenogenetic species cannot vary"; in fact, he made experiments showing reversion in parthenogenetic generations of Cypris. There is a useful chapter on "physical degeneration," but we do not understand the author when he says that those who believe in progressive degeneration "have it incumbent upon them to demonstrate either the falsity or the suspension of the law of natural selection." Surely the many "degenerate" animals that we know have not become what they are without the help of selection. Another point that we do not understand is how the fact that "one-half of the nuclear chromatin of each gamete is thrown aside prior to the fusion of the two nuclei," "obviously

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corresponds exactly with Galton's assertion that the two parents between them contribute one-half of the total heritage of the offspring." There is surely a screw loose here. Dr. Saleeby's vivacious style will fascinate some readers and help them over difficult themes, but we wish that he had been sometimes less conversational, as when he speaks of the Bathmic theory of organic evolution as "an amusing piece of nonsense." J. A. T.

The Practical Photographer. Library Series. Nos. 24, 25, and 26. 24 and 25, Pictorial Printing, parts i. and ii. Pp. xx+64 and xx+64. 26, Artificial Light and Night Photography. Pp. xx+64. Edited by Rev. F. C. Lambert. (London: Hodder and Stoughton, 1905.) Price 1*s.* net.

WE have before us three more additions to this very practical and useful series of photographic handbooks, with which most of our photographic readers are now well acquainted. The first two are devoted to pictorial printing, in which are brought together many methods by which the negatives may be altered, the print controlled during printing, or generally or locally modified according to desire.

For the most part No. 24 treats chiefly of the employment of one negative only, while No. 25 is devoted chiefly to combination printing and enlarging, cloud negatives, and cloud printing. Both numbers are preceded by interesting and well illustrated *résumés* of the pictorial work of Bessie Stanford and Percy Lewis, which to the beginner should serve as admirable types of high order work.

The third number belongs to quite another branch of photography, namely, that in which the incident light on the object is for the most part artificial, such as flashlight, candle light, gas light, acetylene, &c. Here we have a collection of notes by numerous workers, all of whom have secured some interesting pictures by one or other of these methods. As before, the reader is not left to gather his ideas from the text alone, but is introduced to some interesting pictures with notes describing under what conditions they were taken. This number also contains an account by the editor of the pictorial work of J. C. Warburg, with a reproduction of many of his most typical photographs.

These three numbers thus form a welcome addition to those previously published, and will certainly be appreciated by those workers to whom they specially appeal.

Introduction to the Study of Organic Chemistry. By John Wade, D.Sc. (Lond.). New and enlarged edition. Pp. xx+646. (London: Swan Sonnenschein and Co., Ltd., 1905.) Price 8*s.* 6*d.* net.

THE fact that the present volume has reached its second edition points to the public appreciation of Dr. Wade's book. This is not surprising.

The arrangement of the subjects bears evidence of the author's thought, and the immense number of facts compiled speaks eloquently of his industry.

There are several novel features to which the author directs attention in the preface, and which possess certain merits. There is no doubt that charts or surveys, which serve to show, in a condensed form, the relation of a variety of compounds, are an aid to the memory, and the author has introduced them freely.

The principle of making a thorough study of a single common substance like ethyl alcohol and then dealing with its more important derivatives before thrusting the student into the tangle of homologous series has very much to recommend it.

Perhaps the title of the book is a little misleading. One would be inclined to suppose that a student who was familiar with these 624 pages of closely printed matter might be regarded as a well informed organic chemist; but he has only an introductory knowledge. We must express our respect for those who have passed beyond this "introduction," whilst others who may be examined in the information required by Dr. Wade's introductory standard demand our sympathy. The illustrations exhibit rather too plainly the defects of photography applied to glass apparatus, though they possess a realistic character which may appeal to the student. We are glad to notice the author's respect for the traditional spelling of the word *radical.* J. B. C.

The Romance of Insect Life. Interesting Descriptions of the Strange and Curious in the Insect World. By Edmund Selous. With twenty-one illustrations by Lancelot Speed and Carton Moore Park. Pp. 352. (London: Seeley and Co., Ltd., 1906.)

THE letterpress consists of a series of extracts, derived from a variety of sources, relating to ants, termites, locusts, butterflies, water-insects, fireflies, scorpions, &c., connected together by general observations on all kinds of subjects. Occasionally the compiler's remarks on the senses of insects or on mimicry are worthy of notice, but they are frequently in bad taste and often inaccurate, which is not surprising, as we are constantly told that he is only quoting his data second-hand, and has not seen the original records.

This is a pretty book, but otherwise we regret that we have little to say in its praise. The author suggests that the genus of grasshoppers called "Scudderia" were so named because they "scud," though Scudder's name is actually referred to on the opposite page. As an illustration of style and inaccuracy we may quote the following:—"From 1778 to 1780 a dreadful curse of locusts, alluded to by Southey in his 'Curse of Kehama,'—or perhaps forming the subject of that poem—I really don't know—fell upon the Empire of Morocco." There are *two lines* relating to locusts in the "Kehama," and it is "Thalaba" in which they are noticed at greater length.

There are really only sixteen page illustrations, some of them being double—*i.e.* divided in the middle, and thus making up the twenty-one of the title-page.

Most of our scientific men must be very far behind other people, for Mr. Selous tells us, "Everybody knows nowadays how all the different species of animals and plants, living and extinct, have come into existence," &c., &c.

Errors in Latin names abound, the worst being Orthoptera for Ornithoptera wherever it occurs. It is a pity that a book intended to popularise natural history should not have been more carefully written and edited. It almost looks as if the compiler thought anything would be good enough for his prospective readers.

The Art and Practice of Laundry Work for Students and Teachers. By Margaret Cuthbert Rankin. Pp. 191. (London: Blackie and Son, Ltd., 1905.) Price 2*s.* 6*d.*

THERE is little that is scientific in this book; it gives the impression, indeed, that even the teachers of laundry work are guided by empirical rules. It should be possible to inculcate the broad scientific principles upon which the art and practice are based while teaching girls how to do their laundry-work successfully. The washing of clothes, and the other processes through which they pass in the laundry, would then not be matters of rule of thumb, but intelligent applications of scientific principles to particular purposes.

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